I. Understanding the Disease and Pathophysiology

1. The small bowel biopsy results state, “flat mucosa with villus atrophy and hyperplastic crypts – inflammatory infiltrate in lamina propria.” What does these results tell you about the change in the anatomy of the small intestine?

The flat mucosa and villus atrophy indicate that there is going to be less surface area in the small intestine and therefore malabsorption/malnutrition will occur. The hyperplastic crypts and inflammatory infiltrate adds to the destruction of the small intestines, which furthers malabsorption/malnutrition.

2. What is the etiology of celiac disease? Is anything in Mrs. Gaines’s history typical of patients with celiac disease? Explain

The etiology of celiac disease is unknown but it has been linked with genetics. If a close family member has celiac disease the likelihood of another member getting celiac disease is much higher. Typical symptoms of celiac disease are changes in bowel movements, tiredness, weakness, and weight loss (Celiac Disease, 2011). It appears in Mrs. Gaines’s past history that she has often had diarrhea on and off ever since her adulthood, significant weight loss, and complains of having little to no energy. All of which are common symptoms of someone who has celiac disease.

3. How is celiac disease related to the damage to the small intestine that the endoscopy and biopsy results indicate?

Celiac disease is an immune system disease. When individuals consume gluten the immune systems response is to destroy it because it views it as an invader. While the small intestine is destroying the gluten it is also damaging parts of the small intestines. This is the reason for the flattening of the mucosa, villus atrophy, hyperplastic crypts and inflammatory infiltrate in lamina propria that was found in Mrs. Gaines’s endoscopy and biopsy (Celiac Disease, 2011).

4. What are AGA and EMA antibodies? Explain the connection between the presence of antibodies and the etiology of celiac disease.

AGA stands for antigliadin antibodies and EMA stands for anti-endomysial antibodies. They are both antibodies that are produced by the immune system in a response to the perceived threat of the gluten protein. These two antibodies are only produced when the immune systems senses gluten as an invader that needs to be destroyed (The Sample Test, 2013).

5. What is a 72-hour fecal fat test? What are the normal results for the test?

The fecal fat test measures the amount of fat in the stool. This helps estimate the percentage of dietary fat that the body does not absorb. Normal results for this test is less than 7 grams of fat per each 24 hours (Dugdale, 2012).
6. Mrs. Gaines’s laboratory report shows that her fecal fat was 11.5 g fat/24 hours. What does this mean?

If an individual has more than 7 grams of fat present in their fecal material in a 24-hour time period than they have fat malabsorption, which is called steatorrhea (Dugdale, 2012). Mrs. Gaines’s fat content in fecal material is clearly above the normal range and this indicates a fat malabsorption.

7. Why was the patient placed on a 100- g fat diet when her diet history indicates that her symptoms are much worst with fried foods?

Mrs. Gaines was put on a 100 grams fat diet because 100 grams is a normal amount of fat in a regular diet. This is part of the control of the fecal fat test and if there is no malabsorption than test results should be regular (less than 7g-fat/24hrs) (Dugdale, 2012). If Mrs. Gaines had consumed an extremely high amount or low amount it may have skewed the results of the fecal fat test.

II. Understanding the Nutrition Therapy

8. Gluten restriction is the major component of the medical nutrition therapy for celiac disease. What is gluten? Where is it found?

Gluten is a protein that is found in wheat, rye and barley. It is found in foods such as bread, crackers, and pasta (Celiac Disease, 2012).

9. Can patients on a gluten- free diet tolerate oats?

Yes, they are able to tolerate oats. However the biggest concern is cross contamination with oat products but oats themselves are not harmful to celiac disease individuals (Thompson, 2006).

10. What sources other than foods might introduce gluten to the patient?

Non-food items that may contain gluten in them are sunscreen, make up, lotions, shampoos, pet food, and some medicines (5 Unexpected Sources, 2013).

11. Can patients with celiac disease also be lactose intolerant?

Yes, it is possible that a patient with celiac disease is lactose intolerant too. Whenever there is distress in the GI tract, the first enzyme to stop production is lactase usually. Thus causing lactose intolerance.

III. Nutrition Assessment
A. Evaluation of Weight/Body Composition

12. Calculate the patient’s percent UBW and BMI, and explain the nutritional risk associated with each value.

UBW = 92lbs/112lbs = 82%
BMI = 41.8kg/(1.60)2 = 16.3
Mrs. Gaines is 18% under her normal body weight and her BMI puts her in the underweight category. She has had severe weight loss over the past 3 months. Nutritionally it appears she is malnourished and having inadequate oral intake.

B. Calculation of Nutrient Requirements
13. Calculate this patient’s total energy and protein needs using the Harris- Benedict equation or Mifflin-St. Jeor equation.

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655 + (9.6 \times 41.8\text{kg}) + (1.8 \times 160\text{cm}) - (4.7 \times 36) = 1175\text{kcals}
\]

\[
1175 \times 1.3 \times 1.0 = 1527.5 > 1528 \text{ kcals needed/day}
\]

\[
1.3 \times 41.8\text{kg} = 54.3\text{g-protein/day}
\]

C. Intake Domain
14. Evaluate Mrs. Gaines’s 24-hour recall for adequacy.

She is consuming around 500 calories according to her 24-hour food recall prior to her admission. This is only around 30% of her daily calorie needs. She is nearly low on all her macronutrients except for fat and all her micronutrients as well (MyPlate).

15. From the information gathered with the intake domain, list possible nutrition problems using the diagnostic term.

- Inadequate energy intake (NI-1.4)
- Inadequate oral intake (NI 2.1)
- Malnutrition (NI-5.2)
- Inadequate protein intake (NI-5.7.1)
- Inadequate vitamin intake (NI 5.9.1)
- Inadequate mineral intake (NI 5.10.2)

D. Clinical Domain
16. Evaluate Mrs. Gaines’s laboratory measures for nutritional significance. Identify all laboratory values that support a nutrition problem.

Mrs. Gaines’s albumin and prealbumin levels are significantly lower than they should be. Her albumin level is 2.9L when it should be in the 3.5-5L in order to be in the normal range. Then for her prealbumin levels it is 13L when it should be in the range of 16-35L in order to be considered normal. Her folate and ferritin levels were below the normal range as well. Also AGA and EMA antibodies were tested positive in her lab values.

17. Are the abnormalities identified in question 16 related to the consequences of celiac disease. Explain.

Yes, the abnormalities are definitely related to celiac disease. When an individual has celiac disease malabsorption generally occurs. When malabsorption happens then deficiencies in vitamins and minerals will also happen. When there are low levels of albumin, prealbumin, ferritin, and folate, this usually indicates an iron deficiency and anemia. Also AGA and EMA antibodies are only produced when the immune systems senses gluten as an invader that needs to be destroyed (The Sample Test, 2013).

18. Are any symptoms from Mrs. Gaines’s physical examination consistent with her laboratory values? Explain.
Yes, Mrs. Gaines’s physical examination is consistent with her laboratory values. Mrs. Gaines is stated to have weakness and fatigue. These are both symptoms of an iron deficiency and anemia. Iron is linked with red blood cells and is needed to bring oxygen to tissues of the body. When the body lacks iron then the red blood cells are slowed down and less oxygen is being delivered to cells. Also with the production of the AGA and EMA antibodies means there is damage to her GI tract and resulting in the constant diarrhea.

19. Evaluate Mrs. Gaines’s other anthropometric measurements. Using the available data, calculate her arm muscle area.

\[
AMA = \left\{ \frac{(MAC-(\pi \times TSF))/(4 \times \pi)}{4 \times \pi} \right\} - 6.5 \text{ (female)} = \left\{ \frac{(18\text{cm}-(\pi \times 0.75\text{cm}))/ (4 \times \pi)}{4 \times \pi} \right\} - 6.5 = 12.97\text{cm} > 13\text{cm}
\]

Interpret this information for nutritional significance.

Mrs. Gaines AMA is 13cm and puts her just slightly below the 50% range, which indicates that her muscle is severely wasted.

20. From the information gathered within the clinical domain, list possible nutrition problems using the diagnostic term.

- Altered GI function (NC 1.4)
- Impaired nutrient utilization (NC- 2.1)
- Underweight (NC-3.1)
- Unintended weight loss (NC 3.2)

IV. Nutrition Diagnosis

21. Using the VA Nutrition Screening Form, what is the patients’ nutrition status level?

Her status level is at a 3. A 4 is the highest nutritional status and a 1 is the lowest.

22. Select two high-priority nutrition problems and complete the PES statement for each.

- Food and Nutrition related knowledge deficit (NB-1.1) related to the new diagnosis of celiac disease as evidenced by not knowing what was causing her intractable diarrhea and no reported medical history of family members with celiac disease diagnoses.

- Inadequate oral intake (NI-2.1) related to consuming around 30% of her daily calories needs as evidenced by her recent weight loss, fatigue, and weakness.

V. Nutrition Intervention

23. For each of the PES statements that you have written, establish an ideal goal (based on the signs and symptoms) and an appropriate intervention (based on the etiology).

- Food and Nutrition related knowledge deficit (NB-1.1)
  Goal: No more GI distress/destruction
  Intervention: Nutrition Education: Celiac disease and gluten free diet.

- Inadequate oral intake (NI-2.1)
  Goal: Have no further weight loss.
  Intervention: Dietary Modification: Gluten free diet.
24. What type of diet would you initially begin when you consider the potential intestinal damage that Mrs. Gaines has?

I would recommend a GI soft and low residue diet. This would have been gentle on her damaged GI tract.

25. Mrs. Gaines’s nutritional status is so compromised that she might benefit from high calorie, high protein supplementation. What would you recommend?

Mrs. Gaines would benefit from drinking an Ensure Plus along with her meals. This is lactose free, relatively high in calories( 355kcals/8oz), and high in nutrients.

26. Would glutamine supplementation help Mrs. Gaines during the healing process? What form of glutamine supplementation would you recommend?

Yes, a glutamine supplementation would help Mrs. Gaines heal because indicated by multiple factors her muscles have been broken down severely. Glutamine might help gut function, the immune system, and other essential processes in the body, especially in times of stress. It is also important for providing "fuel" because of nitrogen and carbon to many different cells in the body. About one third of this nitrogen comes from glutamine. Since Mrs. Gaines is not having adequate protein intake and indications of muscle wasting then taking glutamine supplements might keep the glutamine stores up to avoid muscle wasting. (Glutamine, 2009).

27. What result can Mrs. Gaines expect from restricting all foods with gluten? Will she have to follow this diet for very long?

After she eliminates all gluten from her diet she will notice the reversing of all the GI distress such as the diarrhea, the flat mucosa and the villus atrophy. The damage to her villi will almost be completely reversed. This will have to be a life long diet because once gluten is introduced back into the diet the same symptoms will come back.